Cement MILL SECTION of

Concrete

Vol. 28 MARCH, 1926 No. 3

Shells Used at Pacific Coast Plant

Dredge and Barges Supply Raw Material Direct to Plant

The accompanying illustrations show the first and last steps in the manufacturing process at the plant of the Pacific Portland Cement Co. at Redwood City, California. The plant is located on one arm of San Francisco Bay, where the principal source of raw material—oyster shells—is readily accessible by water.

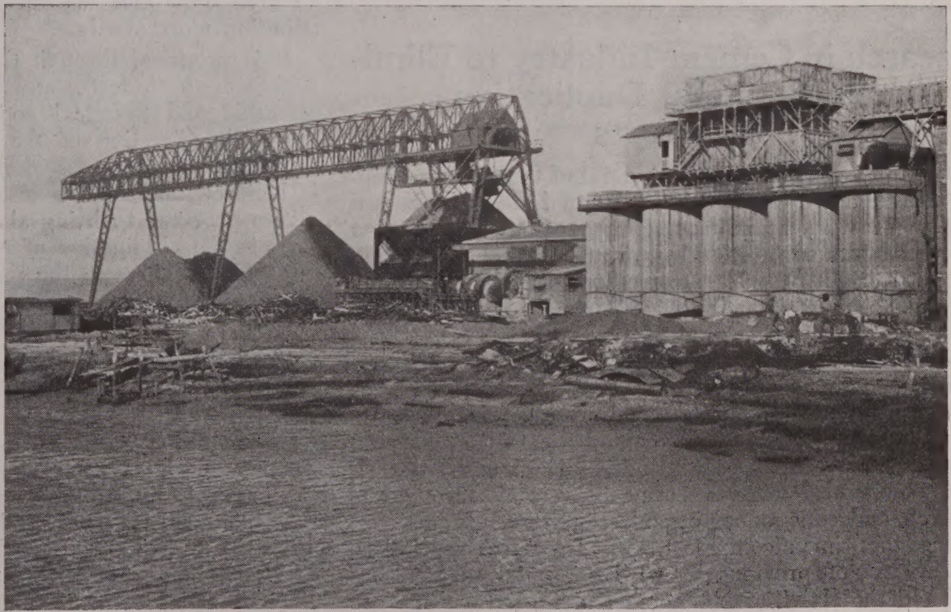
It is estimated that millions of tons of oyster shells are available in the locality and that the plant at Redwood City, with a capacity of 2,000 barrels of cement per day, has an available supply sufficient to last almost indefinitely. The shells are pumped up from the bottom of the bay by suction dredges and transferred to barges in which they are allowed to drain and are then transported to the storage on the dock at the plant.

The silt picked up with the shells contains a certain percentage of silica and alumina and the shells furnish the large percentage of calcium carbonate required in the manufacture of a high grade portland cement. The shells are found to be virtually pure lime and are more easily worked than the limestone from the deposits in that district.

The shells are taken to the dock at the plant in barge cargoes of 400 tons and are there unloaded by an electrically operated traveling crane with a bucket having a capacity of four cubic yards. The crane is of the high-speed two-rail trolley type. From the ground line to the tracks is 68 ft. and the total length of the crane is 340 ft. These shells together with the sand and silt dredged up with them are dumped by the crane in piles, to be later placed in the hoppers from whence they are transported by screw conveyors to the grinding mills. From the raw grinding mills the slurry passes to the slurry tanks and after being analyzed is pumped to the blending tanks from whence it is again pumped to the kiln feeds.

The two kilns are 10 ft. in diameter and 235 ft. long and turn one revolution in about 90 seconds. Oil is used for firing the kilns, the spray being forced into the kilns by means of air from electrically driven air compressors.

Fig. 1—The raw material storage of the Pacific Portland Cement Co.'s plant at Redwood City, California, with a part of the plant showing at the right. In the foreground is one of the shell beds from which the raw materials are obtained, the bed being about 50 ft. wide and 3,000 ft. long and having an estimated depth of about 110 ft. At the left is shown the crane which unloads the shells from the barges. Beneath the crane are the piles of shells and the hoppers into which the reclaimed shells are dropped by the crane



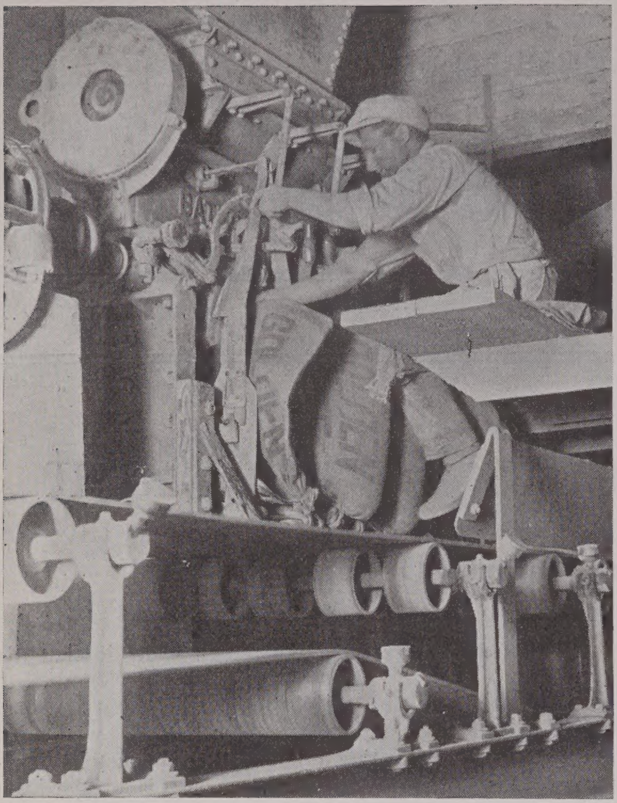


Fig. 2—Automatic Bates valve bagging machines filling cement sacks ready for shipment

Fig. 2 shows the Bates automatic valve bagging machine in operation packing the finished product. The filled bags drop from the machine onto the conveyor belt shown in operation, and are delivered to the cars for shipment. Shipments of cement are also made by water from the plant.

The shell beds from which the supply is taken range from 10 to 300 ft. in depth and from a few hundred feet to more than a mile in length. The dredge works from the open water side toward shore, making its own channel in which to float.

Research in Cement Industry to Eliminate Wasteful Duplication of Efforts

With the assembling and trying out of the needed equipment, there are in sight discoveries of hitherto unknown phenomena of scientific character regarding the hydration and behavior of portland cement. These are being brought to light by extensive researches being carried on at the Bureau of Standards, Department of Commerce, Washington, D. C.

The Department of Commerce announced eighteen months ago that a broad and scientific investigation of the constitution and character of portland cement was to be undertaken under the Portland Cement Fellowship maintained at the Bureau. Under this plan the department co-operates with the cement industry through its research and educational organization.

Since that time a competent staff of research specialists, making use of previous knowledge on the subject, has explored the activities both here and in Europe and are conducting what is perhaps one of the most comprehensive research programs ever attempted by an industrial enterprise.

It is believed that the character of information which is now coming to light will provide basic information about the material. This information in turn will be useful both in the future developments of manufacture and of specifications for both manufacture and use of the product.

The Bureau of Standards is active not only in this fundamental research work but is also conducting practical experiments in the interest of the engineering users of portland cement, which it is believed will throw further light on proper methods of tests and the development of improvements in the standard specifications.

The present standard specifications used on practically all engineering undertakings were developed under the sponsorship of the Bureau of Standards and constitute one of its earliest endeavors in industrial standardization.

Secretary of Commerce Hoover appointed on January, 1924, an advisory committee to make, under the general direction of the Department of Commerce, a comprehensive survey of the properties and uses of cement and concrete. The committee will co-operate with the Bureau of Standards and officials of the department.

This committee consists of: John Lyle Harrington, chairman, engineer, Kansas City, Missouri; C. H. Boynton, cement manufacturer, New York; N. Max Dunning, architect, Chicago; H. C. Turner, contractor, New York, and Charles M. Upham, highway engineer, Raleigh, North Carolina.

The cement industry has grown so rapidly and has achieved such great importance in the United States and the use of cement in the construction of roads, bridges and buildings has become so great and so diversified that the intelligent and appropriate use of this material becomes a matter of great economic interest to the public, Secretary Hoover stated.

Research work is now being carried on by the Bureau of Standards and by various public and private research laboratories and commercial and professional organizations in the properties, characteristics and proper use of cement; in the improvement of methods, equipment and appliances tending toward improved efficiency and economy; the seasonal use of cement, especially in winter weather, important in its relation to continuity of employment of labor and the elimination of "peaks" and "depressions" and the spread of manufacture and distribution more evenly.

It is proposed through the survey to co-relate for the benefit of the industry and the public the results of such scientific and technical activities and to center in and under the direction of the Department of Commerce a thorough and disinterested study of the entire subject. It is believed that such concentration of effort as the committee proposes to bring about will produce material results in the elimination of wasteful duplication of effort, and effect savings to the public and result in benefit to the manufacturer.

£34,000,000 has been allocated from the British road fund from 1920 to 1925. The total value of these works will be about £54,000,000. Net payments of £15,250,000 were made during the fiscal year ending March 31, 1925. Further special assistance was given to highway authorities in rural areas to the extent of £1,000,000 and the sum of £1,250,000 has been allotted for such assistance in 1925-1926. £6,500,000 has been allocated for a program of reconstruction of certain trunk roads as a means of relieving unemployment. The expenditure will be spread out over two years. The trunk roads selected include the Great North Road, the London-Holyhead Road, and the roads from London to Brighton and Folkestone.

No-Accident Year Rewards Four Years of Effort

By JOHN DEMPSTER
Editor, "Plantate News," Canada Cement Company, Port Colborne, Ont.

Under the heading "365 Days Without an Accident," a paper was presented at the 1925 meeting of the Cement Section of the National Safety Council by L. M. McDonald, superintendent of the Port Colborne plant of the Canada Cement Co. Abstracts from that paper were printed in the pages of the Cement Mill Section of CONCRETE for November, 1925.

The following article taken from the "National Safety News" indicates that on January 12, 1926, the no-accident year had been extended to 468 days without a minute of lost time, and the enthusiastic campaign was being still carried on.

The "Honor Flag" hoisted at the Port Colborne plant at the beginning of 1925 was still flying, although only a few shreds remained to proclaim nearly 16 months without a lost time accident.

Somebody said that it couldn't be done, but we went ahead and we did it, and, in an editorial of the *Welland Tribune and Telegraph*, dated January 12 and headed "Slaying a Dragon," we were paid a tribute for the accomplishment. The editor of that newspaper states: "A few evenings ago, management and employees made merry over the fact that 468 days had passed at the Port Colborne plant without one minute of lost time on the part of any employee because of accident. That record was one well worthy of being celebrated, not only for the 468 days, not only because there are 250 employees, but more especially because of the extreme hazards that lie in the path of the worker in a cement mill. Yet 250 workmen have worked unscathed for 468 days—a total of nearly 120,000 accident-less days in all, or nearly 400 working years."

From an unenviable position at the foot of the accident prevention ladder of the Portland Cement Association, to a solid stand on the top-most rung in four years, is the result of the fight waged against accidents by the Port Colborne plant of the Canada Cement Co., Ltd., that inspired the editorial.

In June, 1921, horrified by our accident list, we started the first organized effort to reduce it. We were ready to try any scheme that came along, and we tried them all—except the right one. We went after a "no-accident" month—and failed.

Our accident toll at that time was: 1920—48 lost-time accidents, 906 days lost, 2 fatalities; 1921—67 lost-time accidents, 925 days lost, 0 fatalities.

We struggled along through 1921 getting no better; then we changed our method of forming safety committees and tried again for a "no-accident" month and in February, 1922, we did it. It seemed as if we were on the right road at last, for we had a second clear month in April, but we were too sure. We had not come to realize that systematic education was the only method to use and in spite of two more clear months during the year we closed 1922 with 3 fatalities, 16 accidents and 335 days' lost time.

During the winter of 1922-23 the machine-shop foreman devised a dial for registering the number of days since the last accident and this created an interest among the employees that has never abated. Those dials are now working in 23 places throughout the plant and registering the number 473.

In 1923 we still had to cope with the dragon. Not until September of that year did we seem to find the correct organization. At a gathering of the safety committee a heart-to-heart talk was given to the foreman by the superintendent, L. McDonald, and his assistant, J. Cuthbert, and the responsibility for the safety of the plant was placed squarely upon the shoulders of the foreman. The plan was rather staggering at first but after viewing the problem in the right light and with the safety committee composed of foremen alone we hit upon the method that has brought us success.

A flag had been offered previously by the company, to be awarded to the plant that operated for three consecutive months without a lost-time accident, and by operating through October, November and December, 1923, without a blot we won that coveted honor. This flag was raised on January 1, 1924, and was to fly until an accident took place, and, on February 25, 1924, we lost it again. However, we had received heart and we tried again, but an unfortunate fatal accident made us realize that we were not *automatic* in our safety thoughts and actions. We were enabled to raise the "Honor Flag" again on September 1, and we lost it 25 days after, but we had nine clear months scattered throughout the year and December, 1924, closed with reduced total of 3 lost-time accidents, 39 days lost and 1 fatality. As we had our last accident on September 25, 1924, the "Honor Flag" was raised on January 1, 1925, and it is still there, or rather, what is left of it. Only a few shreds still cling to the halyards, but those few torn shreds have more honor and value in our eyes than anything ever devised, for they represent almost 16 consecutive months of operation without a lost-time accident.

What is the secret of our success? First, acting more upon the creed of Chopin, the great musician, who said, "Gold will not shine until it is polished, yet nevertheless it is always gold," than upon the policy of brute force, we claimed that in man always was the natural instinct of safety, but it needed to be brought out by careful polishing, or systematic education. As soon as men began to realize their own polish they took pride in it and endeavored to retain it, even to amplify it, and the trick was done. Secondly, we believed in safety by education and *more* education. Our machine guards are duplicated everywhere, but our men are an educated body of safe workers who have been tried "as if by fire."

On January 1, 1925, we adopted a slogan and set an objective that seemed, to an outsider, to be absurd, but which, to our boys, was a goal to be reached, namely "Make 1925 a no-accident year." We did it, and the accomplishment culminated in a celebration the equal of which has never been held in Canada before.

Lime in 1925

Production Shows Increase of 11% in Quantity and 7% in Value Over 1924

The lime sold in the United States in 1925 amounted to 4,510,000 short tons, valued at $42,530,000, according to estimates furnished by lime manufacturers to the Bureau of Mines, Department of Commerce. These figures show an increase of 11% in quantity and 7% in value over the sales in 1924. The sales of hydrated lime, which are included in these figures, amounted to 1,505,000 tons, valued at $14,926,000, an increase of 14% in quantity and 13% in value. The average unit value of all lime showed a decrease from $9.72 a ton in 1924 to $9.43 in 1925, and that of hydrated lime a decrease from $10.03 a ton in 1924 to $9.92 in 1925.

Ohio, the leading State, showed an increase of 13.5% in total sales and 14% in sales of hydrated lime. Pennsylvania, which ranked second, showed an increase of 12.5% in total sales. Of the 22 States in which more than 25,000 tons were sold, only 3 showed decreased sales.

Sales of building lime were about 2,365,000 tons, an increase of 9%. The estimated sales of chemical lime for 1925 were 1,885,000 tons, an increase of 14%. The dead-burned dolomite reported as sold for refractory is estimated at 375,000 tons compared with 328,659 tons in 1924. The demand for lime for use in agriculture was somewhat better in 1925 than in 1924, and the sales are estimated at 260,000 tons, an increase of 5%.

LIME SOLD BY THE PRODUCERS IN THE UNITED STATES IN 1924 AND 1925

	1924			1925 (estimated)		
	Hydrated lime	Total lime		Hydrated lime	Total lime	
State	(Short tons)	(Short tons)	Value	(Short tons)	(Short tons)	Value
Ohio	654,763	934,407	$ 9,511,270	745,000	1,061,000	$10,664,000
Pennsylvania	189,431	700,380	5,634,806	210,000	788,000	6,434,000
West Virginia	44,841	238,714	1,884,682	52,000	295,000	2,095,000
Missouri	60,651	243,465	2,354,175	74,000	272,000	2,605,000
Wisconsin	18,246	235,030	2,129,701	21,000	243,000	2,140,000
Massachusetts	(*)	194,402	2,693,028	(*)	195,000	2,520,000
Virginia	38,001	172,776	1,409,447	50,000	190,000	1,460,000
Alabama	23,465	204,059	1,812,282	27,000	180,000	1,550,000
Tennessee	44,242	144,292	1,111,781	43,000	177,000	1,318,000
Indiana	44,697	116,927	991,003	43,000	126,000	1,022,000
Maine	(*)	125,688	1,809,929	(*)	117,000	1,600,000
Illinois	(*)	89,132	934,199	(*)	98,000	1,017,000
New York	(*)	98,592	991,799	22,000	94,000	906,000
Michigan	(*)	73,096	702,072	10,000	91,000	874,000
Texas	25,496	60,565	570,334	29,000	70,000	678,000
Vermont	(*)	56,484	710,739	(*)	69,000	741,000
California	(*)	59,583	658,138	13,000	66,000	857,000
Connecticut	(*)	58,851	796,541	(*)	63,000	762,000
Maryland	29,134	56,178	470,105	38,000	59,000	500,000
Arizona	(*)	27,972	331,756	(*)	46,000	460,000
Washington	(*)	28,188	353,450	(*)	29,000	355,000
Minnesota	(*)	25,764	319,066	(*)	(*)	(*)
Undistributed	143,697	127,455	1,416,120	128,000	181,000	1,972,000
	1,316,664	4,072,000	$39,596,423	1,505,000	4,510,000	$42,530,000

(*) Included under "Undistributed."

Cement Production in January Shows Decrease

Shipments Beat Former January Record—Present Stocks Never Before Exceeded

January shipments of portland cement were the highest for that month in any year and show an increase of nearly 11% as compared with January, 1925, according to the Bureau of Mines, Department of Commerce. Production shows a decrease of 824,000 barrels, while stocks of portland cement have never been exceeded and are over 17% greater than at the end of January, 1925. The tables, prepared by the Division of Mineral Resources and Statistics of the Bureau of Mines, are compiled from reports for January, 1926, received direct from all manufacturing plants except one, for which estimates were necessary on account of lack of returns.

The tables indicate that production for January, 1926, was 8,032,000 barrels, shipments amounted to 5,721,000 barrels and stocks at the end of the month totaled 20,677,000 barrels. The estimated clinker or unground cement at the mills at the end of January, 1926, is reported as 8,939,000 barrels as compared with 7,017,000 barrels for January, 1925.

Exports of hydraulic cement by countries in December, 1925 the total of which was 100,323 barrels valued at $296,900, were as follows: To Canada, 1,172 barrels; Central America, 14,388 barrels; Cuba, 21,372 barrels; other West Indies, 5,444 barrels; Mexico, 5,604 barrels; South America, 46,924 barrels; other countries, 5,419 barrels.

Imports from Belgium in December totaled 146,863 barrels; from Canada, 197 barrels; from Denmark, 77,661 barrels; from France, 6 barrels; from Germany, 1,442 barrels; from Japan, 3,700 barrels; from Norway, 64,977 barrels; from United Kingdom, 697 barrels. The grand total of imports for the month of December, 1925, was 295,543 barrels valued at $526,001. Total imports for the year 1925 are given at 3,655,317 barrels valued at $5,813,928. Exports for the year totaled 1,019,597 barrels valued at $3,003,128.

Relative Merits of Cotton and Jute Cement Bags

Tests by the Bureau of Standards Indicate That Jute Burlap Sacks Are Superior to More Expensive Cotton Osnaburg Sacks

A paper issued by the U. S. Bureau of Standards as Technologic Paper No. 292 by Robert J. Morris contains information concerning the tests made and the apparatus used in determining the relative merits of one type of cotton osnaburg and several types of jute burlap sacks used as containers for portland cement. A brief description is given of the physical tests made, such as breaking strength, thread count, length, width, stretch, and, of greater importance, the resistance to failure from dropping or rough handling; also of the practical tests made, such as the service test, for which the sacks were put into actual service; the hot cement test, in which the sacks were filled with hot, freshly ground cement; the humidity test, in which samples were exposed to various atmospheric conditions; and the moisture test, during which the sacks of cement were subjected to excessively damp conditions. The results of all these tests are given the paper in tabular and graphical form. From these data the type of sack with the most serviceability was chosen.

Much of the cement used in this country is packed and shipped in cloth containers. Whenever one of these containers is badly torn by rough handling or seriously caked by exposure to moisture, there may be a loss of both the cement and the sack. To meet the demand of the cement industry, approximately 75,000,000 cotton osnaburg sacks are required each year, representing an annual outlay of $13,000,000. The same number of "high-count" Dundee burlap sacks can be purchased for about $10,000,000. The problem of reducing the expense either by increasing the life of the sacks or by finding a lower priced sack that is no less serviceable led the Portland Cement Association in co-operation with the Bureau of Standards to investigate the performance of containers of various types.

A committee was appointed by the Portland Cement Association to select the types of sacks to be investigated. This committee selected and sent to the Bureau of Standards five different types of sacks, namely, one cotton osnabury, two high-count jute Dundee and low-count jute Dundee. The osnaburg sack is the kind now used by the cement industry, and the particular osnaburg selected for this investigation was considered to be the best of its kind available. Of the four jute sacks the two high-count types represent the better class of jute sacks and the remaining two are of a poorer grade.

The laboratory tests described in this paper were all conducted at the Bureau of Standards by a research fellow of the Portland Cement Association.

Each of the five types investigated was given a distinguishing number, the cotton sack being designated as No. 1, the two high-count jute sacks No. 2 and No. 5, and the two other jute sacks No. 3 and No. 4. In all, over 500 sacks were used in the course of the work.

Acknowledgment is made in the paper to W. D. Lober, chairman of the package committee of the Portland Cement Association, and to F. R. McGowan, formerly of the Bureau of Standards, for helpful suggestions in connection with the investigation.

Summary

Five types of cement sacks—a cotton osnaburg and four jute burlap types—were studied to determine their relative merits in regard to their suitability as cement containers.

Various conditions of service were simulated as follows: (a) Repeated shipping between two points about 200 miles apart; (b) filling with hot, freshly ground cement; (c) exposure to various atmospheric conditions, and (d) exposure to excessively damp conditions.

Tests were made of the physical properties in order to determine the effect of these conditions and exposures. These tests included determinations of dimensions, thread count, weight, breaking strength and resistance to drop. Standard methods of test were followed for all of these except drop, for which no method had been formulated.

A drop test was formulated, as follows: Apparatus was built which would permit the sack to be dropped from a trap door through a distance of 8 ft. to a smooth cement floor. The trapdoor consisted of a double door, upon which the sack was placed lengthwise along the line where the doors joined. This arrangement prevented the sacks from turning while falling. The test was repeated until the fabric failed, the number of drops necessary to produce failure indicating the resistance to drop.

The tests made in this investigation have clearly demonstrated that a cement sack can be made of jute burlap and be not only as good but considerably superior to the more expensive cotton osnaburg tested. It should be borne in mind that only one type of osnaburg sack was used in these tests. Undoubtedly other types may now or eventually be placed on the market, which may be better than the type used. Of course, jute sacks of poorer quality may prove unsatisfactory, but if the jute sack selected is similar to sack No. 2 in this investigation, better service, together with considerable saving, price conditions remaining the same, will result. The tests of this sack made on the original material showed the following characteristics: Thread count, warp 18, filling 18½, breaking strength (1x1x3 in. grab method), warp 153 lbs., filling 167 lbs., weight, 11.8 ounces per square yard; stretch, warp, 4 per cent; filling, 4 per cent; number of drops necessary before failure, 8.

Arthur D. Little, Inc., chemists, engineers and managers of Cambridge, Mass., have announced the addition to their staff of Dr. A. W. Francis and Dr. Christian V. Holland. Dr. Francis was National Research Fellow in Chemistry at the Massachusetts Institute of Technology, where he was engaged in work on Directive Influence in the Benzine Ring. Dr. Holland has been engaged in natural gas work.

Thorne L. Wheeler, formerly of Wheeler & Woodruff, chemical engineers of New York, has joined the organization of Arthur D. Little, Inc., chemists, engineers and managers of Cambridge, Mass.

Foreign Trade in American Portland Cement Industry

The United States exported only 0.59% of its annual output in 1924, according to reports of the Department of Commerce. Belgium with approximately one-twelfth of the annual production exported 50.47% of its output in the same year and Denmark with a production of less than 4,000,000 bbls. exported 52.06% of its annual output.

During the year 1924, the output of the American portland cement industry was greater than that of any previous year in its history, and the annual production for 1925 again surpassed all previous records. That a continual increase in annual production and domestic sales over a period of years does not alone complete the picture presented by the American portland cement industry is emphasized by J. S. McGrath of the Minerals Division, Department of Commerce, in a special cement bulletin issued late last year. It is further pointed out that in addition to these data must also be considered the effect our foreign trade in cement has upon the domestic industry.

The paper is not intended to furnish a remedy for existing conditions, but merely to show, by figures carefully compiled, the situation of the American portland cement industry with particular respect to its natural markets, both foreign and domestic, and the competition encountered therein from foreign producers. All figures submitted herein have been secured from U. S. government official sources. Statistics for 1925, however, are not final figures and are subject to possible revision.

The compiled figures show a steady increase in the annual output, shipments and number of plants producing portland cement in the United States during the years 1913 to 1925, inclusive. However, the continual increase in our annual imports of foreign cement, combined with the very noticeable decrease in our exports of this product, must also be considered in order to clearly understand the present situation of the American portland cement industry.

In 1918, 114 active plants in the United States produced 71,081,663 bbls. of portland cement of 376 lbs. each and shipments amounted to 70,915,508 bbls. The total imports for the same year amounted to only 302 bbls. as compared with 81,338 bbls. in 1913. The total exports for 1918 were 2,252,446 bbls. and in 1913, 3,999,715 bbls.

In 1924 with 132 active plants, the total U. S. production was 148,859,000; shipments, 145,747,000; imports, 2,010,936 bbls., and exports had decreased to 878,543 bbls. The 1925 figures with still greater production and imports indicate smaller exports than for 1924.

With respect to the competition encountered by domestic manufacturers of portland cement from foreign producers, it is to be noted that only those markets located along the border of continental confines of the United States, including Porto Rico and Hawaii, are actually affected. Foreign cement has not as yet entered inland markets to any appreciable extent. Among the customs districts named as receiving the largest imports of cement are Massachusetts, Philadelphia, Florida, Los Angeles and Porto Rico.

Paragraph 1543, Free List, of the Tariff Act of 1922 on Imports into the United States stipulates that Roman, portland and other hydraulic cement may be imported into the United States free of duty, provided—"That if any country, dependency, province or other subdivision of government, imposes a duty on such cement imported from the United States, an equal duty shall be imposed upon such cement coming into the United States from such country, dependency, province or other subdivision of government."

As a result of this clause in the U. S. Tariff Act of 1922, Belgian, Danish and British cement enters the U. S. free of duty, while upon that exported to the United States from Norway, Sweden, Netherlands, Germany, France, Canada and Japan is imposed a duty similar in amount to that levied upon cement entering these countries from the United States. (Definite information as to the present tariff status of cement imported from these countries may be obtained from the Division of Customs, Treasury Department, Washington, D. C.)

A New Departure in Commercial Organization Publications

A new idea among periodicals of commercial and civic organizations was instituted by the Merchants' Association of New York at the beginning of the present year, in the publication for the benefit of its members and all who are interested in the work of the association of a current digest based primarily upon the idea of service and containing in the briefest possible form a digest of what the Merchants' Association is doing.

This association is an organization fully representing New York's commercial interests and is advanced to make their collective influence effective for the common good. It is in opposition to the policy of associations issuing official publications, soliciting advertising largely on an improper basis, and securing entry to the post office as second class mail under a subterfuge. It is founded partly on the idea that associations publishing advertising bulletins are out of their province and that manufacturers are allowing big leaks in their advertising appropriations in patronizing the bulletins as advertising media.

High points worthy of mention relative to the *Service Bulletin* include the following:

Everything is in typewritten form and is boiled down as though telegraphed, only such material being given as is of service to the membership.

The loose leaf plan and heading references are intended to facilitate actual use within the institution.

Any lengthy subjects are included as inserts so they will not take away from the brevity of the main service and can be read or not as interest dictates.

Such enclosures as the legislative service have a practical value in being separate as many people wish to file them for reference.

The general offices of the association are in the Woolworth Building, 233 Broadway, New York City.

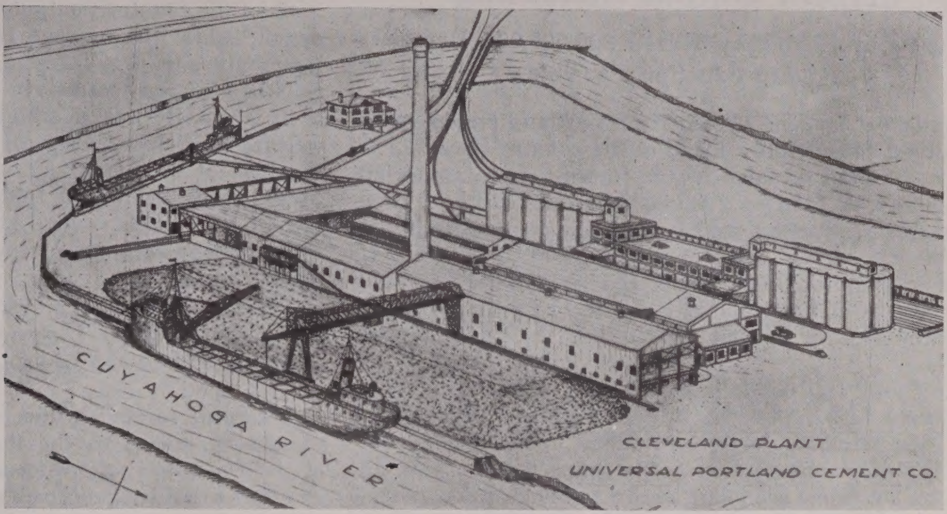
European Office for Allis-Chalmers

Allis-Chalmers business in Continental Europe will be handled through an organization recently incorporated as Allis-Chalmers (France), with headquarters at 3 rue Taitbout, Paris. H. I. Keen, who has been manager of European sales through the company's district office in Paris, will be managing director of the new organization.

The company has maintained for many years an office in London, 728 Salisbury House, London Wall, F. C. 2.

Luis Rosner of Kansas City, Missouri, sales manager of the Great Western Portland Cement Co., one of the larger western cement companies, is quoted as stating that present indications point to a larger building program this year than last. There has been a big increase in the use of cement in residence building as well as commercial building in the district observed.

New plant to be built by Universal Portland Cement Co. on the Cuyahoga River, Cleveland, Ohio



Universal Plans New Plant for Cleveland

The Universal Portland Cement Co. has just bought a tract of land in Cleveland, Ohio, upon which it intends to build a modern cement plant with capacity of a million and a half barrels annually.

The land is located on the Cuyahoga River in the heart of the industrial section. Limestone, one of the principal raw materials, will be transported from Rogers City, Mich., by boat and unloaded at the plant. Other material required for manufacturing will be procured locally. The plant will be located on the Newburgh & South Shore Railway which connects with all railroads entering Cleveland. Its central location in Cleveland will permit cement to be trucked direct from mill to the job. Being located on the Cuyahoga River, cement can be shipped by boat to lake ports such as Buffalo, Toledo and Detroit.

Plans for the new plant which have already been drawn are being perfected and it is expected construction will start in the near future.

The Universal company now has plants at Chicago, Pittsburgh and Duluth with annual capacity of over 16,500,000 barrels, which upon the completion of the new plant at Cleveland will be increased to about 18,000,000 barrels capacity.

New Phoenix Corporation to Build Plant in South

A new company has been organized, named the Phoenix Portland Cement Corporation, for the purpose of constructing a new portland cement plant five and one-half miles west of Birmingham at Powderly, Alabama. A number of the leading business men in Birmingham are associated with this new enterprise.

The company has acquired 140 acres of land lying between the Southern Railway and the Atlanta, Birmingham and Atlantic Ry., just west of Powderly Station. The location of the plant will make possible an adequate supply of cheap fuel, power, labor and raw materials. All of the 140 acres is underlaid with a very fine deposit of high grade limestone, excellently suited for the manufacture of the highest quality of portland cement. The property has been diamond drilled, and exhaustive tests by the company's engineers and chemists show that there is sufficient raw material at the plant site to operate the plant at full capacity for 120 years. Ground has been broken for the building of the new plant.

The plant will have an initial capacity of 1,300,000 barrels annually, but is designed to increase this capacity as rapidly as market conditions warrant it. The company's engineers first made a careful study of all of the latest American cement plants, and then spent some time in Europe last fall studying the latest European cement mill practice, with the result that they have designed a plant in which have been embodied the best features of the American practice, combined with the best features of the European practice. The plant will be materially different from the existing American cement plants, and will contain many unusual features designed to effect economies in labor, power and fuel, and to produce an unusually high quality of cement. The wet process will be used, and the manufacturing units will be the largest ever installed in this country. The two rotary kilns will be the largest in the world, as they will be 11 ft. 3 in. in diameter and 330 ft. long. The largest kilns now in operation are 265 ft. long. The grinding mills, which will be 7 in. in diameter and 40 ft. long, will be the largest in the United States.

The plant buildings will all be of reinforced concrete and steel, and are designed to be architecturally attractive, as well as substantial. It is the desire of the organization to make this one of the most attractive industrial plants in the South, and much thought has been given to this phase of it. Among other unique features, the plant is designed to be absolutely dustless by using the latest American and European methods of dust collection and prevention.

The plant will be built by the Phoenix organization, under the direction of R. J. Hawn, chief engineer. Work started on the new project February 6, and the plant will be completed about January 1, 1927.

The officers of the company are as follows: Lindley C. Morton, president; E. P. Haubert, secretary and treasurer; S. C. McCurdy, sales manager; R. J. Hawn, chief engineer; R. E. Roscoe, supervising chemist.

The Phoenix Portland Cement Corporation is a separate organizaiton and should not be confused with the Phoenix Portland Cement Co., of which Mr. Morton is also president, and which operates a plant at Nazareth, Pa. The Nazareth plant is being enlarged and the capacity increased from 1,000,000 to 1,600,000 barrels annually. The new work is progressing satisfactorily and will be in operation May 1.

Cement Output Increasing

Capacity in 1926 May Reach 200,000,000 Barrels—Overproduction Possible

Productive capacity of American portland cement mills has forged considerably ahead of the country's needs.

This has been revealed by the forecast, from authoritative sources, that during 1926 enough mills will have been completed to give the industry a productive capacity of 200,000,000 barrels, or more than 37,000,000 tons. At the same time the United States Bureau of Mines has announced that in 1925, admittedly a record year in cement use, shipments of cement totaled less than 157,000,000 barrels.

Street and road work is expected to continue in 1926 at the same rate as last year or even slightly higher. However, such activities require only 25% of the cement output. Building construction is not expected to show an increase, and some economists have announced that reduction in building volume would not be surprising.

Overproduction Possible

The portland cement field would then be considerably over-equipped, and a forced reversion to the wasteful plan of part capacity operation would be in prospect. Cement manufacturing requires more capital per workman than almost any other industry. Capital turnover is slow—less than three times in five years. Hence, if efficiency of operation is to be had, the plant must run as near to full capacity as possible, manufacturers say. It is pointed out that if the use of cement should become stabilized at present figures, with the enlarged facilities soon to be ready, operation at only 78% capacity would produce all the cement needed in the United States.

During 1925 shipments of cement from mill to user exceeded those of 1924 by 7.3%, or 10,700,000 barrels. However, so many new mills and extensions were brought into operation during 1925 that the total production exceeded the shipments by nearly 5,000,000 barrels.

This surplus went into plant stock houses, the capacity of which has been so generally increased during the past few years that the total storage possible is now much greater than formerly.

Indications are that the 200,000,000 barrels a year, which will probably be reached in 1926, is by no means to be the high point. While completion of a plant usually requires from one to two years, construction work is already under way or will soon start, on seven additional cement plants. Twenty-eight others have been announced within the last two years. This latter figure, however, includes many that doubtless will never be built, since it is believed many promoters will decide to abandon their projects in the face of the rapidly growing excess of productive capacity over needs.

When these seven plants are completed in 1927, they should add another 7,000,000 barrels a year to the total possible output. Should any building slump occur, declare cement manufacturers, the part-time operation schedules forced on the industry by this excess capacity would tend strongly toward stiff reduction of earnings.

Shipments 80% of Capacity

In 1925, it has been pointed out, shipments totaled about 80% of present mill capacity. This afforded the cement industry generally a fairly prosperous year. However, five years previous in 1920, when the industry was able to operate at only about 70% of capacity, a considerably different situation was revealed.

H. Parker Willis called attention in his book, "Portland Cement Prices," to the fact that several members of an important group of eastern mills, making more than 25% of the country's output, operated in 1920 at an actual deficit, while the average earnings of the whole group were only 5.0% on invested capital.

This 5% was earned in a year when industrial activity generally was at a high tide. Yet in 1921, which is well remembered as a year of depression, the average earnings of all manufacturing corporations, as reported by the Commissioner of Internal Revenue on the basis of income tax returns, were 13.0%, more than 2½ times the cement plant earnings of the good year previous.—*Wall Street Journal.*

To Study Cement Materials in Arkansas

A careful survey of the cement situation in Arkansas will be conducted by the engineering experiment station of the University of Arkansas, it has been announced, in an effort to find some cheaper method of obtaining cement in Arkansas. Cement is shipped into the state at a high cost because of existing freight rates, there being no cement mills in the state. The project, which is the fourth industrial one to be undertaken by the experiment station since its institution in 1920, will include a survey of the cement making materials of the state, with a view of establishing mills for the manufacture of portland cement within the state. Professor W. R. Spencer of the Engineering College will direct the work and will be assisted by advanced engineering students.

During the Christmas holidays a special kiln was received by the engineering experiment station for furthering the tests. The station already has in its laboratory a ball mill as part of its road material testing equipment which will be utilized in pulverizing the samples of cement material. In the spring the university engineers conducting the experiment will gather raw cement materials, such as limestone, shale and clay, in Washington and Benton counties, which are within easy truck hauling distance of the university city. Later on, it is planned to cover other sections of the state, if sufficient appropriations are available.

A recent state bulletin states that Arkansas possesses ideal cement making materials in its chalk, bauxite and pure limestones. It has only recently been discovered that the alumina in bauxite when mixed with clay produces a cement unaffected by salt and alkaline waters. Arkansas has many acres of low-grade bauxite suitable for the manufacture of cement of this character. The chalks of southwestern Arkansas have been used in the manufacture of a perfect cement. This industry was promoted in the pioneer days of the material, but with little success. The industry has recently been revived and much capital invested in a plant in Little River County. No other state has finer clays in such close proximity to its limestone, chalk or bauxite fields than Arkansas. Economic conditions form the chief barrier to the formation of a development company, since it would be very hard for a new concern to compete with the large cement corporations of other states.

New Cement to Use Slag

A wet process cement plant is being planned for Buffalo, N. Y., by the Federal Cement Co. The project is being sponsored by officials of the Standard Slag Co. of Youngstown, Ohio. The plant will have incorporated in it a number of the features developed at the Ford Motor Company's cement plant at River Rouge, Mich., where blast furnace slag is used in the manufacture of cement.

Adelmer Marcus Bates

Inventor of Valve Bag Dies Suddenly

Adelmer Marcus Bates, president of the Bates Valve ag Co. of Chicago, died from heart failure while walkng in 47th Street, New York City, on January 21. He vas born in 1868 in Iowa Falls, Iowa.

When four years of age, his father moved from Iowa alls to Adams County, Wisconsin, traveling in a covered vagon. Adelmer was educated in the public schools, vorking during vacations on his father's farm.

He entered Shattuck Military School at Fairbault, Minesota, working his own way through the school by selling t. Paul and Minneapolis papers, dealing in coal and sellng insurance.

From 1894 to 1899, he lived in Chicago and was emloyed by the Worcester Salt Co. as a traveling salesman. y exceptional ability and industry and with extraordiary success as a sales manager he was instrumental in reatly increasing the business of that company.

He was forcibly struck by the crude methods employed y the salt companies in filling their small packages of able salt and while pondering over the problem of how mprovement could be made in these methods, in the year 899, he was seized with the idea of the feasibility of a elf-closing bag. It was in the evening hours at the Hyde ark Hotel in Chicago, after a hard day's work, that he nade the first cloth valve bag, the generic invention which vas the basis of his future success.

Years of hard work and trying experiences followed in leveloping machinery for the filling of such a bag. His irst work was at the salt works of the Joy Morton Co. at he mouth of the Chicago River. A successful machine vas designed which was, after repeated failures, subseuently used in nearly every salt plant throughout the Jnited States.

He then turned his attention to the development of nachines for filling valve bags with cement, plaster and ther rock products. After several years of experimentaion a machine was evolved that filled the bag, weighed he contents, automatically cut off the flow of material nd discharged the filled bag from the machine to a traveling belt that carried it to the car door. This machine vas so efficient that it won its way rapidly into all the ement mills, plaster mills and hydrated lime plants of he United States and Canada. By its use four men were nabled to fill, weigh, close and place in the car 12,000 5-lb. bags of cement in a working day, an accomplishnent unheard of previously in packing cement. So valable was this invention that cement manufacturers in all he principal countries of the world saw its merits and pplied it in the packing of their product. It is now eing used even in China, Japan and India, where labor s so cheap that it would seem a labor saving device would e inapplicable.

In 1907 every cement and plaster bag was tied at the pen end by the use of jute string. With great energy, Ir. Bates threw his efforts into the task of converting the ement companies to the new method of closing their loth bags with wire. A new wire tie was invented and ew ingenious automatic machinery for manufacturing he tie was engineered, with the result that every cloth ement and plaster bag in the United States is now closed vith a wire tie.

The Bates company's most recent innovation in the acking of pulverized rock products is the multi-wall aper valve bag.

From a very small beginning, the Bates Valve Bag Co. as developed into one of the large and necessary industries of the country. The company has its main office at 8200 South Chicago Avenue, Chicago, with branches in Nazareth and New Castle, Pennsylvania; Birmingham, Alabama; Los Angeles, California; Niagara Falls, Ontario, Canada; Yokohama, Japan; Sydney, Australia; Hanover, Germany; Malmo, Sweden, and Paris, France.

Mr. Bates leaves a widow, two sons, Mark C. Bates and George A. Bates, and one daughter, Isabel, residing in the winter at 5630 Woodlawn Avenue and in the summer at Flossmoor.

Lehigh Cement Plant in Florida

The annual meeting of the stockholders of the Lehigh Portland Cement Co. at Allentown, Pa., January 20, brought together the owners of the largest cement concern in the world. According to a statement by a representative, the output of the combined 20 mills is 23,400,000 bbls. a year, a report from Bath, Pa., states, 8,000,000 more than any other cement concern in the United States and this difference between the Lehigh portland and the largest concern in America represents about the annual output of the largest cement concern in Europe.

Directors elected are: General Harry C. Trexler, Colonel Edward M. Young, George K. Mosser, John D. Ormrod and Daniel E. Ritter.

In order to meet the demand for homes in Florida it was decided at the meeting to erect a mill in that state at Ocala. A corps of engineers left recently for Florida with instructions to proceed with all possible celerity.

The 20 mills of the Lehigh portland extend to almost every corner of the United States, with the farthest north near Catskill, N. Y., the most southern at Birmingham, Ala., and the one farthest west at Metaline Falls, Wash. Mills acquired during the year were the new Bath plant at Sandt's Eddy on the Delaware, from which plant shipments are expected soon, the Alsen mills and Tidewater plant at Union Bridge, Md.

Cement Trust Case Dropped by State

On the motion of Jesse W. Barrett, St. Louis, former attorney general of Missouri, the state supreme court on January 28 dismissed the anti-trust suit against the Atlas Portland Cement Co. of Hannibal, according to a report from Jefferson City.

The proceeding was instituted by Barrett while he was head of the state legal department. The dismissal was by stipulation, it is understood.

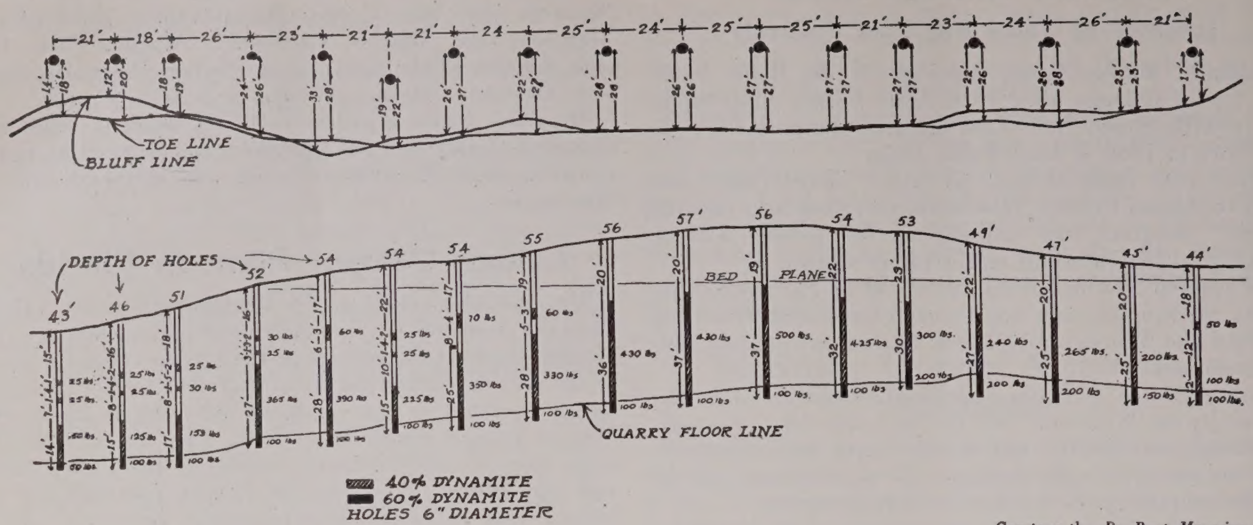
Barrett, as attorney general, filed suits under the Missouri anti-trust law against lumber companies and building material dealers, alleging price fixing and restraint of trade. An essential element of the suit by Barrett was the supplying of data to the companies on prices and trade conditions by a central trade organization.

A similar case was instituted in the United States supreme court against the Atlas and other companies. That court upheld the right of trade associations to furnish information to their members.

Settlement of the federal case also virtually settled the state case, it is understood.

Nebraska Company Protests Rates on Sacks

The Nebraska Cement Co. filed complaint with the Interstate Commerce Commission February 3 representing that the rail rates on empty sacks or bags returned from Iowa points to its mill at Superior, Nebraska, are unreasonable and give undue advantage to competing mills located at Mason City, Des Moines and Gilmore City, Iowa, which are accorded lower rates.



Courtesy the *Du Pont Magazine.*

This diagram was copied from a pencil sketch made by Mr. Moore before the first bore hole was drilled

Five Tons of Rock per Pound of Explosives

The Result of Following the Precept—"Plan Your Work, and Then Work Your Plan"

That's good counsel, and almost every one accepts it in principle. But how many people follow the precept? Certainly not so many as might do so with profit, and that's why this story is worth telling.

Out in Missouri the S. J. White Stone Co., a subsidiary of the Kansas City Bridge Co., operates a limestone quarry at Blackwater, where large quantities of rock are produced for road building, bridge construction and levee work in and around Missouri. The superintendent in charge of this quarry is J. A. Moore, a graduate of the University of Kansas, and a captain of the U. S. Engineers during the late war.

Anyone so trained would be expected to follow a planned work program—and Mr. Moore does. Before any quarry blasting is undertaken he makes a layout of each shot, indicating all the data you will find on the chart reproduced below. Thus he has the entire plan of the shot for record, and if it doesn't break well at some place, when fired, he can look for the cause.

Does planned work pay? Well, take the record of the shot just mentioned. The blast was set off early in 1924. The total charge was 5,458 lbs. of 40% Red Cross Extra and 2,000 lbs. of 60% strength. The shot brought down 38,000 tons of rock—5.1 tons per pound of explosives used. The fragmentation was excellent, and the total cost, including stripping, drilling, labor of loading and explosives, was 8.9 cents a ton. Does planned work pay? It does.

Acme Plant Purchased by North American Cement Corporation

The Acme Cement Corporation, which has owned and operated a cement plant located on the Hudson River five miles south of the village of Catskill, New York, has been consolidated by purchase with the North American Cement Corporation.

The North American Corporation organized during 1925 and prior to the acquisition of the Acme property has owned and operated two other plants and one lime plant: The plant of the former Helderberg Portland Cement Co. at Howes Cave, New York; the cement plant of the former Security Cement & Lime Co. at Hagerstown, Maryland, and the lime plant of the former Security Cement & Lime Co. at Berkeley, West Virginia.

William H. Baker, president and general manager, and Luther G. McConnell, secretary and treasurer, of the Acme Cement Corporation will both continue in executive positions with the North American Cement Corporation. Mr. Baker is moving his family immediately to Montclair, New Jersey, although he will maintain a summer home in Saugerties. Mr. McConnell's headquarters will be in New York City, but for the present he and his family will continue to reside in Saugerties.

The construction and improvement program which has been under way at the Acme plant for several months will be pushed forward to completion.

The combined cement output of the three plants now owned and operated by the North American Cement Corporation will be approximately 4,000,000 bbls. per annum. During 1925 the Acme plant manufactured, shipped and sold over 900,000 barrels of Acme portland cement. This is almost three times the output in 1922, the progress of the company since that year having been notable.—*Catskill Daily Mail.*

New Magnesite Cement

A new magnesite cement, with a tensile strength 60 per cent of steel, is being studied by the government, with favorable conclusions so far, according to the *Kipling Washington Letter.* It is stated that the cement may be used extensively without steel reinforcing for construction and that it also seems to have superior qualities for road building.

Is New Trustee

Claremont, Jan. 3.—John Treanor of Los Angeles, president of the Riverside Portland Cement Co., member of the California Club and trustee of the Good Samaritan Hospital at Los Angeles, has been appointed a trustee of Pomona College. He will fill the place left vacant by the resignation due to advancing years of Stephen H. Herrick of Riverside. Mr. Herrick had been a constant adviser and friend of the college since 1902.

Lift Truck Handles Large Number of Cement Sacks

That the cost of handling cement sacks in the cement plant is materially reduced by the use of the lift truck system, with a consequent reduction in manufacturing costs of cement is claimed by the Barrett-Cravens Co., Chicago, Illinois, and the accompanying sketch of a recent installation in one of the large cement plants is reproduced to illustrate the possible savings effected by eliminating constant handling and rehandling of the sacks. CONCRETE is indebted to the Barrett-Cravens Co. for the sketch as well as for the following information.

As the empty bundles of cement sacks are received in freight cars, one man loads them in bundle units, on empty Barrett Steeleg platforms—the estimated size of which is 30 in. wide by 54 in. long by 9½ in. high. Each platform will handle in the neighborhood of 40 bundles, whereas the average present two-wheel truck-load is six bundles each. It is easy to visualize the savings possible at this point alone. One man will handle approximately seven times as many sacks at one time in one operation.

The bundle of sacks, after being loaded onto the platforms, are taken inside and stored in the rear of the building, or some other convenient place, until operators at the first cleaning belt are ready for them. They are then taken, 40 bundles at a time, to the cleaning belt. As the usual method enables one man to handle only six bundles at a time, another great saving in handling is effected through the use of the lift truck. The fact that the bags have not been handled since having been loaded onto the platforms in the freight car should be noted. They were not unloaded onto the floor and then loaded back again on the lift truck platform when being taken to the cleaning belt. Likewise, they will not be unloaded from the platforms when arriving at the cleaning belt before placing them on the belt.

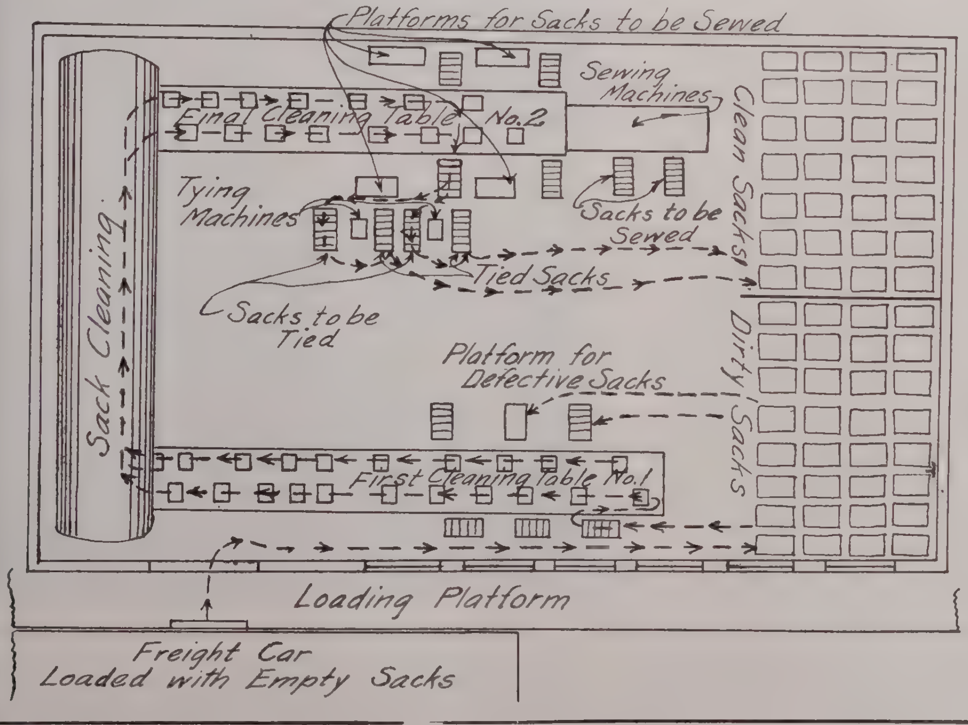
At the cleaning belt No. 1 they are taken off, sorted, and placed on the belt. Sacks requiring repairs are stored on an empty platform placed conveniently at the back of the operator. Sacks for cleaning are thrown on the belt. As the loaded platform becomes empty, it is equipped with end pieces and taken over to cleaning belt No. 2. Here the empty platforms are loaded with the sacks as they are taken from the belt—after having passed through the cleaning drum. The loaded platforms of clean sacks are then taken to the bag-tier. Such sacks as come through the cleaning drum and prove to be defective, requiring attention at the sewing machines, are again thrown on empty platforms at the back of the men stationed at cleaning belt No. 2. The loaded platforms as stated, are taken to the bag-tier. Each platform will be stacked with at least 1,350 sacks, which are handled at one time, in one operation. Again a great saving is effected by enabling one man to handle at least six times as many sacks as he does with the ordinary two or four-wheel truck.

The man tying the sacks has a loaded platform at his left and an empty platform at his right. As he ties the sacks, he tosses them onto the empty platform. At regular intervals, he stops and ties them into bundles. When the platform at his right is loaded with tied sacks, the one at his left will be empty, as a transfer of sacks from one to the other has taken place. The empty platform is switched to his right side, while another loaded platform is brought to him from belt No. 2.

The platform loaded with tied sacks is then taken to the proper storage space at the rear of the building, awaiting the time when the entire load, as a unit, will be taken to the department where the sacks are filled.

It should be noted that at no time will the sacks touch the floor. True economy is possible by eliminating handling and rehandling of the sacks, and that is possible only by keeping the sacks off the floor.

A recent survey made in the Lehigh Portland Cement plant at Oglesby, Illinois, prompted the recommendation of the following lift truck equipment—as an initial installation. While it was evident that additional equipment would be required ultimately, the manufacturers desire to have new users start with a small lay-out and build up.


Platforms for Sacks to be Sewed
Sewing Machines
Final Cleaning Table No. 2
Clean Sacks
Tying Machines
Sacks to be Sewed
Tied Sacks
Sacks to be Tied
Sack Cleaning
Platform for Defective Sacks
Dirty Sacks
First Cleaning Table No. 1
Loading Platform
Freight Car Loaded with Empty Sacks

Outline of route of empty cement sacks from the car in which they are returned, through the cleaning and mending departments to storage

For this plant they specified two Barrett lift trucks, known as Model G-948, with the following specifications:

Length of carrying frame	48 in.
Width of carrying frame	18 in.
Wheel diameter	9 in.
Capacity	2500 lbs.
Minimum platform handled	25 x 48 in.
Maximum platform handled	36 x 60 in.

The platforms required were 30 in. wide by 54 in. long. Twenty platforms were to be equipped with super-structures, or ends, previously mentioned, to be put on the platforms as they are emptied at belt No. 1 before taking them to belt No. 2.

In addition to the 20 platforms equipped with these super-structures, 30 were to be plain, making a total of 50 platforms.

With the Barrett lift truck system, all unnecessary handling and rehandling, loading and unloading was absolutely eliminated.

From the initial handling of the sacks until the time the sacks leave the plant, filled, no unnecessary handling is possible. The system is practicable under nearly all conditions, and superior to other modes of handling, because with the lift trucks the operators are not confined to any certain route of travel or any definite size or weight of loads, or hampered by any other conditions that may enter.

Barrett lift trucks are recommended by the manufacturers as particularly desirable for this work in that they not only lift more easily, but operate more quickly than other trucks, and in addition, they lift with a single stroke of the handle from an angle.

Timely Safety Posters Prevent Accidents

"Accidents are human mistakes," says W. H. Cameron, managing director of the National Safety Council. "Men don't always think; they lack imagination; frequently they forget; their judgment isn't uniformly sound; often they simply don't know, and sometimes they take unnecessary and dangerous chances.

"Constructive safety posters make men more thoughtful; they arouse imagination; they remind men always to be careful; they teach from the experience of others and thus enable men to exercise better judgment; they show how to do things in the safe way, and they warn men of the tragic folly of chance-taking.

"Workmen have no desire to get hurt. Safety means everything to them. They are willing to do their part to prevent accidents, but they need constant reminders such as the National Safety Council poster service provides."

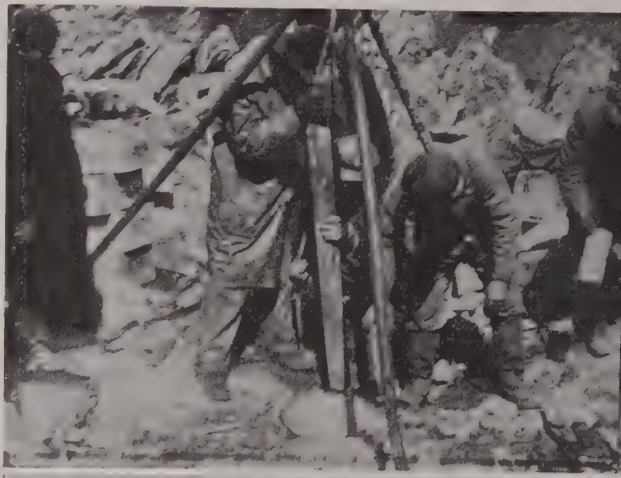
There are several posters that should interest people in the cement industry contained in the 1926 catalog of the National Safety Council which presents 252 miniature reproductions of the latest bulletins. To date the National Safety Council has issued more than 5,000 different posters. Millions of copies of these timely messages have been distributed. It is estimated they are read by 7,000,000 workers daily. Copies of the catalog and the large size posters may be had by addressing Managing Director Cameron at 108 East Ohio Street, Chicago, Ill.

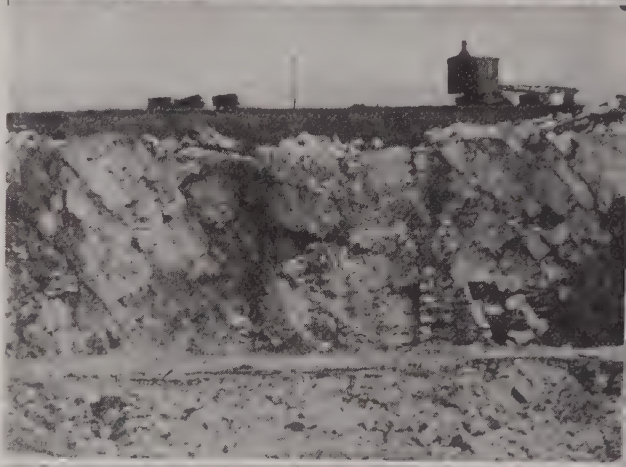
Whether or not the recent nation-wide building boom will continue at the same pace in the immediate future will depend mostly on the trend of building wages and the cost of building materials, according to a report of the National Industrial Conference Board, New York City.

With rents the country over at a fairly stable average level, the general tendency being downward rather tha upward, there is an indication that the country at larg has fairly well caught up with the housing shortage, th report continues.

Dynamite in Quarry Work

A one-reel picture depicting the use of dynamite i quarries throughout the country has been prepared by th E. I. du Pont de Nemours & Co., Wilmington, Del. Th accompanying illustrations are taken from the film an illustrate one of the several methods of blasting which in clude well drill, coyote hole and bench shots.





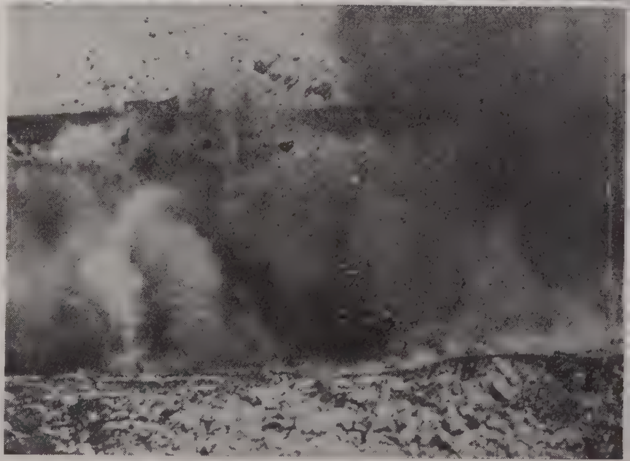


Fig. 1—Loading a hole at the Knickerbocker Lime Company's quarry at Paoli, Pa.

Fig. 2—View of the quarry just before the blast

Fig. 3—The blast as it appears in one of the views on the film

Huron Portland Cement Company to Handle Ford Cement

Announcements have been sent out by the Ford Motor Co., Edsel B. Ford, president, and the Huron Portland Cement Co., John W. Boardman, vice-president, telling of the affiliation of their interest in the sale and distribution of portland cement by which arrangement, effective February 1, the Huron Portland Cement Co. became exclusive sales agents for Ford portland cement as produced by the Ford Motor Co.

All inquiries for Ford portland cement and all communications relating thereto should be addressed to the Huron Portland Cement Co., 1325 Ford Building, Detroit, Michigan. The Huron Portland Cement Co. has distributing plants at Alpena, Milwaukee, Duluth, Detroit, Wyandotte and Cleveland served by water transportation. By means of rail and water shipments cement is transported at as far west as Montana and south as far as Ohio by the Huron company.

The Ford Motor Co.'s plant is a wet process plant located at River Rouge, Michigan, and a complete detailed description was included in an earlier issue of CONCRETE.

New Cement Plant for Alabama

The Santa Rosa Portland Cement Co., organized by Charles L. Hall, also connected with the Hermitage Portland Cement Co., has awarded contracts to the H. K. Ferguson Co., Cleveland, Ohio, for the engineering and erection of a new cement plant having a daily capacity of 5,000 barrels to be erected at St. Stephens, Alabama.

The plant will consist of a producing plant at St. Stephens, Alabama, on the Tombigbee River with warehouses to be built at Tampa, Florida, Mobile, Alabama, and New Orleans, Louisiana. The warehouses will be of the silo storage type of approximately 60,000 barrels capacity each, together with a complete packing plant. Bulk cement will be shipped direct to these distributing plants from St. Stephens.

The approximate cost of this wet process project will be $3,500,000. The producing plant will contain three kilns 11x185 feet, which will weigh about 300 tons each. The warehouses will consist of two groups of eight silos each at St. Stephens and Mobile. Part of the plant will be designed for waste-heat boilers, but the initial plant will be operated by power purchased from the Alabama Power Co. The H. K. Ferguson's contract also includes equipment.

Ellis Soper, consulting engineer of New York City, is acting as consulting engineer for the owner.

R. C. Newhouse Associated with Cowham Engineering Co.

R. C. Newhouse has recently resigned as chief engineer of the Crushing and Cement Machinery Department of the Allis-Chalmers Manufacturing Co., to become vice-president and manager of the Engineering Department of the Cowham Engineering Co. of Chicago. Mr. Newhouse has long been associated with the cement industry and is considered one of the foremost authorities on cement plant operation. His association with the Cowham Engineering Co. will bring to this organization the experience of a lifetime devoted to design, construction and operation of cement, lime, gypsum, sand and gravel and crushed stone plants.

Mr. Newhouse was educated at Ohio Wesleyan University and after leaving college was employed by the Casparis Stone Co. and the Columbus Construction Co. of Columbus, Ohio. In 1905 he joined the Crushing and Cement Machinery Department of the Allis-Chalmers Manufacturing Co. as sales engineer. In 1910 he was transferred to the main office of the company in Milwaukee in charge of engineering in the Crushing and Cement Machinery Department, which position he has held until his recent resignation. In his position as chief engineer he was responsible for detail and general design of various machines manufactured for cement plants and similar industries. Mr. Newhouse has visited a large number of cement plants in the United States, Canada and Europe and has become intimately acquainted with the various problems of the cement industry.

In his position as chief engineer Mr. Newhouse has not only been responsible for the design of a large number of important machines used in the crushing and cement industries but also for the design of a great number of modern cement plants and rock and ore crushing plants. As an advocate of large combination grinding mills and other factors affecting the design of cement plants, he has contributed largely to the simplicity and efficient operation of the modern plant. He is the inventor and patentee of the Fairmount crusher, grid frame division head compeb mill, combination division head compeb mill, the Concavex, the Newhouse gyratory crusher. He also has been granted numerous patents covering gyratory crushers, jaw crushers, dust collectors, crushing rolls, conveying and transporting machinery, control systems for electric shovels, control systems for automatically operated hoists and other similar devices connected with the crushing, cement and mining industries.

Mr. Newhouse is a member of the American Society of Mechanical Engineers and the Milwaukee Engineering Society, as well as several other professional and social clubs.

As manager of the Engineering Department of the Cowham Engineering Co., Mr. Newhouse will be responsible for the operation of the many plants controlled by that company. The Cowham Engineering Company has recently announced the proposed erection of a plant at Tampa, Florida, for the Florida Portland Cement Co. and one at LaSalle, Illinois, for the Central States Portland Cement Co.

What Is Gypsum?

Gypsum is hydrous calcium sulphate (the sulphate of calcium with water of crystallization in chemical combination) and is expressed chemically as $CaSO_4$ plus $2H_2O$. It contains when pure 79.1% of calcium sulphate ($CaSO_4$) and 20.9% of water (H_2O). The dehydration of ground gypsum rock by physical process yields calcined gypsum, and this is the base from which gypsum plasters and other gypsum products used in building construction are made.

It is the method of calcination employed, and the degree to which such calcination is carried forward, that determines the possibilities and uses to which the calcined product may be applied in the fields of building construction.

Gypsum usually occurs in beds of considerable area from 4 to 30 ft. in thickness. It is quarried or mined in 18 states and Alaska, and is also imported from Nova Scotia, New Brunswick and Ontario, Canada.—*Gypsum Industries News Item.*

To Inspect Cement Plants

Members of the Associated Engineering Societies of St. Louis and their friends made an inspection trip to the cement manufacturing plants of the Missouri Portland Cement Co. recently under the auspices of the American Society of Mechanical Engineers.

Men and Mills

Notes from the Field

The Tidewater Portland Cement Co. of Union Bridge, Md., which went into the hands of receivers last year, was sold to the Lehigh Portland Cement Co. for $3,305,000 by Judge Morris O. Soper in federal district court at Baltimore. The federal court assumed jurisdiction by virtue of the bankruptcy laws.

The Portland cement industry continues very heavy, the several plants in Alabama operating to capacity and the product being shipped as quickly as manufactured. The Atlas Portland Cement Company, at Leeds, is building another unit. A new works for the manufacture of cement is under consideration, tests being made for limestone.

Elmer A. Harrington, during the past year special investigator on X-ray methods at Harvard University, has been appointed research associate on the Portland Cement Association fellowship staff at the Bureau of Standards to conduct research on the application of X-ray methods to problems on Portland cement.

Allis-Chalmers Mfg. Co. has opened a branch sales office at Houston, Texas, in charge of R. I. Moore, who was previously located in their Dallas office. Beginning with the first of the year the office will be located permanently at 1108 Post Dispatch Building. With the establishment of this office, the company will be able more effectively to serve its many customers in this territory.

The Houston office will be operated as a branch of the Dallas district, of which F. W. Burbank is district manager.

A. D. Stancliff has resigned his position with the Atlas Portland Cement Co., Northampton, Pa., and is now with the Louisiana Portland Cement Co., a subsidiary of the International Cement Corporation, in the capacity of superintendent.

It is estimated by the cement committee of the Atlantic States Shippers Advisory Board that car requirements in that district will be more than 29,000 cars for the first quarter. So far as cement is concerned, the movement during the entire year of 1926 will be considerably greater than in 1925. The Cement Committee computed that contracts for 22,604,494 square yards of concrete pavement were let during the first eleven months last year. This was an increase of 2,711,174 square yards over the previous year. The committee does not expect any let-up in present building operations in eastern territory for the next quarter.

The Diamond Power Specialty Corporation of Detroit, Michigan, announces the appointment of M. J. Miller as sales engineer in charge of the Detroit district.

Mr. Miller has had a long and successful career selling Diamond soot blowers, now returning from Philadelphia where he had charge of that district for several years.

The Midwest Portland Cement Co. which has been incorporated under the laws of Colorado recently placed on the market its 7% preferred stock at $100 par value and its common at $1.00 par value. These stocks were being marketed by the Pacific Securities Co., United States Nation Bank building, Denver, Colorado.

The company holds nearly 1,000 acres of raw materials, in the vicinity of Portland and Concrete, Colorado, near the Santa Fe and the Denver & Rio Grande railroads. The officers of the company have pooled 95% of their stock and placed it in escrow, the purpose that of building a modern wet process cement plant.

R. J. Messier, president, has his office at 420 United States National Bank building, Denver.

Paul C. VanZandt, chief engineer of the Ideal Cement Co., Denver, recently addressed the local section of the American Institute of Electrical Engineers on the part that electricity is playing in the manufacture of cement and went into detail as to just what it is proposed to do at its new $2,000,000 cement plant at Boettcher, Colorado, in the new gas fields of Colorado.

Charles Boettcher, president of the Ideal Cement Co., in commenting upon the newspaper reports that the Ideal was to be merged, is quoted as stating that the Ideal Cement Co. is not negotiating with anyone for a merger or consolidation and any reports to the contrary are false in every particular. He had no knowledge of any pending negotiations with the Alpha Portland Cement Co. or the International Cement Corporation.

Financial reorganization of the Pyramid Portland Cement Co., one of the largest industrial organizations of Des Moines, has been effected, according to advices from that city.

Under the plan outlined by President F. H. Mackaman, the Pyramid Portland Cement Co. of Iowa, the holding corporation, has been taken over by the Pyramid Portland Cement Co. of Delaware, the operating company, which will henceforth both own and operate the $2,000,000 plant of the company just south of Valley Junction.

The company will liquidate about $600,000 liabilities of the former holding organization by the issuance of 150,000 shares of preferred stock at $100 par value, the majority of which will be sold to outside interests which have agreed to purchase large blocks of the offering, Mackaman said.

The present owners of the property have agreed to take as payment 250,000 shares of no par common stock which will be issued.

The active officials of the concern will continue to serve. Sales manager, H. W. Lamphere, and general superintendent, P. J. Boberg.

The Pyramid company began operations about two years ago.

Operations at the plant of the Alpha Portland Cement Co. at Bellevue, Michigan, have been suspended since the first of the year. Bins packed to capacity with cement and no market at the present time are given as the causes for the layoff. According to George Lawniczak, superintendent, about 90 employes have been thrown out of work. Only departmental foremen are being retained on the job, and they are to be placed on the construction work of the new crusher building which is now under way. This year's close-down is the first since 1922, excepting for the week at this season each year for repair work.

The National Safety Council offices are now located at 108 East Ohio Street, Chicago, Illinois.

The St. Joseph Lime and Stone Co., St. Joe, Arkansas, has recently passed to new management. The present capacity of the St. Joe plant is 80 tons of crushed limestone and 150 bbls. of lime per day.

John O. Willson is president and superintendent, and J. W. Trieschman of Little Rock, Arkansas, is secretary and sales manager.

H. B. Springer, who has been with the Dixie Portland Cement Co. organization for several years in various capacities, has resigned to accept a new position with the Lehigh Portland Cement Co.

A recent issue of *Dixie Doings* states that Richard Hardy, president of the Dixie company, and Mrs. Hardy were enjoying a visit in Nassau, in the Bahamas, where they were accompanied by George Millen, vice-president, and Mrs. Millen.

A number of members of the Atlas Portland Cement Co.'s Ilasco plant force enjoyed the annual get-together meeting and banquet recently, 22 persons attending a sort of good-fellowship dinner party at Hannibal, Missouri.

The United States Portland Cement Co. on January 29 filed with the Colorado Public Utilities Commission a protest against rates charged by the Atchison, Topeka and Santa Fe, the Denver and Rio Grande Western, the Colorado and Southern and the Colorado and Wyoming railroads on coal shipped from the Trinidad and Walsenburg coal fields to Concrete, Colorado. The cement company asks for a rebate of $45,802, the excess charged them during the past two years.

The Colorado Portland Cement Co. protests the rates charged them by the same railroads, the coal shipped from southern Colorado fields to Portland, Colorado, and asks a rebate of $75,571.

The present rate on slack coal is too high and the commission's attention is directed thereto.

Ideal Cement Co. at its first meeting of the new year elected the seven directors who served during the year ended. They are: Charles Boettcher, Claude K. Boettcher, Harry C. James, R. J. Morse, R. S. Gast, James Q. Newton and James B. Grant.

William Dickinson, vice-president of the Marquette Cement Manufacturing Co., Chicago, Ill., died on January 26, 1926, in the 77th year of his age.

The location of the new Universal Portland Cement Co. plant in Cleveland is regarded as an important step leading to the straightening of the Cuyahoga River. Steps are being taken to eliminate an elbow from the river at the spot where the Universal company will locate its plant.

The incorporation of the Florida Portland Cement Co., Wilmington, Del., with a capital of $12,000,000, is reported from Corporation Trust Co. of America, Dover, Delaware.

Robert J. Beler has recently joined the Pittsburgh sales office of Foote Bros. Gear & Machine Co. as assistant to W. G. Kerr, district representative.

F. H. Hulscher, promoter of the Margella Co., an alleged "paper" cement concern of Chattanooga, Tennessee, was indicted for the fourth time by the grand jury last December on the charge of larceny. It is charged that Hulscher sold stock on the representation that his company owned several hundred acres of land near Chattanooga and was preparing to build a huge cement plant. Officers who investigated declare that the company does not own any land. Hulscher was warned by the Tennessee insurance commissioner that he was violating the "blue sky" law in attempting to sell his stock in this state, but he defied that official, declaring that he was operating under a common law trust and using the mails in his stock selling campaign. It is not known how much stock he had disposed of.

At a special meeting of the stockholders of the Dexter Portland Cement Co. recently held at the general office of the company of Nazareth, the stockholders unanimously approved of a proposition to increase the company's indebtedness from nothing to $2,200,000. The object of increasing the indebtedness is to purchase the plant of the Penn Allen Cement Co. near Bath. The action of the directors in purchasing this plant was ratified by the stockholders.

The combined properties will constitute one of the largest units in the Nazareth section of the Lehigh Valley cement district and will have an annual capacity of 2,350,000 bbls. of cement. Dexter Portland Cement Co., incorporated in 1899, is one of the oldest, best known and most successful companies in the cement industry.

Directors and officers of the Oregon Portland Cement Co., of Oswego, were re-elected January 13 at the company's office in the Wilcox building. Carl W. Gath, secretary and treasurer, was elected a director in place of Franklin I. Fuller, deceased. R. P. Butchart of Victoria, B. C., was re-elected president; L. C. Newlands, vice-president and manager, and C. V. Dolph, attorney in fact and agent. In addition the re-elected directors are M. J. Ballard of Salt Lake City and A. S. Pattullo, George Lawrence, A. H. Devers and Edward Cookingham, all of Portland.

Out of the 12,501 shares of common stock outstanding 10,371 shares were represented.

The report of General Manager Newlands for the year to close of November showed that in the 11 months of that period 419,612 barrels of cement had been produced. At the year's opening 72,000 barrels were on hand, and at the close, 46,000 barrels. Shipments always were made the days orders came in.

Much of this product was used in Portland's building program last year for business structures and Willamette river bridges. Much less of highway paving was done last year than formerly, but the home product was used liberally.

New methods of operating the Roseburg limerock quarry effected a saving of 37 per cent in this item, the manager reported.

The new quarry at Dallas was reported to be producing satisfactorily. Shutdowns at the Oswego mill last year amounted to less than 12 hours' suspension.

The company paid regular dividends last year on the 7 per cent preferred stock, reducing the amount outstanding another 10 per cent. Three per cent dividends on the common stock were paid.—*The Portland Telegram.*

Norman M. Stineman, assistant engineer, structural bureau, Portland Cement Association, has been elected a member of the board of trustees of Ohio Northern University.

Devices for Firing Electric Detonators

By J. B. STONEKING

From *Explosives Service Bulletin*, published by E. I. du Pont de Nemours Co., Inc.

Electric power or lighting circuits undoubtedly furnish the surest means of firing blasts by the electric method, provided, of course, that the proper amount of voltage and amperage can be obtained. In a large number of cases, however, such circuits are not available and electric blasting must be done by other means. It is with these other means of firing electric detonators that this Bulletin will deal.

Second in reliability to power or lighting circuits for electric firing are blasting machines, which are designed expressly for this purpose with a wide range of portability and ease of operation. The principle of the blasting machine is simple. By means of gears, the muscular energy of the operator is made to revolve an armature between magnetic poles, the same as in any dynamo or generator, thus producing electric current for firing the caps. Blasting machines should be used with electric blasting caps connected in series only and never in multiple or parallel.

Du Pont blasting machines are manufactured in the following sizes and capacities:

Pocket—1 to 3 electric blasting caps; No. 2—1 to 10 electric blasting caps; No. 3—1 to 30 electric blasting caps; No. 3-A—1 to 50 electric blasting caps; No. 5—1 to 100 electric blasting caps; No. 6—1 to 150 electric blasting caps.

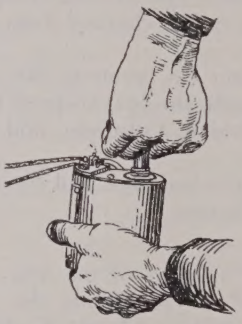
The pocket blasting machine is operated differently from the other machines in that the handle must be given a twisting or turning motion. One end of the carrying handle is attached to a screw cap, which, on being unscrewed, uncovers a socket into which the firing handle is inserted. By grasping the base of the machine in the palm of the left hand and giving a quick, snappy turn of the firing handle with the right hand in a clockwise direction, current is generated which flows out through the leading wires.

The other du Pont blasting machines are all operated by setting them on a firm level place, pulling the rack bar up to its full limit, and then, with both hands on the handle, thrusting the bar downward with all the weight, force and speed possible. Current is not sent out through the leading wires until the end of the downward stroke. Hence it is imperative that the rack bar should strike the bottom of the box with full force and speed. The phrase "Try to knock the bottom out of the box" is aptly expressive of the best method of operating a blasting machine. Some blasters give the bar two or three short, quick preliminary strokes, not over two or three inches long, returning the bar at each stroke to the top limit in a sort of pumping action, followed immediately by the final full down stroke at full speed. This latter method tends to strengthen the magnetic fields and gets the maximum current from the machine. It is, however, conducive of more wear on the parts and care must be taken *not to let the rack bar come near the bottom of the box during the preliminary pumping strokes.*

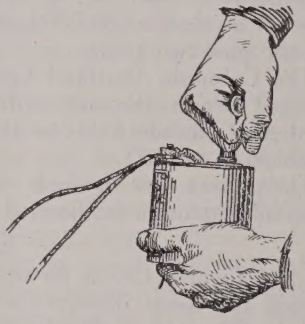
Blasting machines are built strongly to withstand rough usage, but like any machine they will last longer and give more satisfactory results if given a proper amount of care and attention. They should not be thrown around like a piece of drill steel or dropped or rolled down a bench or embankment as this treatment is unnecessarily rough. On the other hand, they do not require as careful handling as a basket of eggs, although the more careful the handling, the longer the life. They should be protected from moisture as much as possible and not stored in damp places nor allowed to lie around on damp ground or be exposed to rainstorms or dripping water.

The pocket machine has permanent magnets and needs but little attention other than a drop of oil occasionally on the various shaft bearings and a very small amount on the gears. In oiling the armature shaft, a minimum amount of oil should be used and care taken that no oil gets on the commutator contact at the end of the shaft.

The rack bar machines have electro magnets and fewer gears and shafts than the pocket type. The armature shaft and pinion should be oiled sparingly and carefully to see that no oil gets on the commutator and brushes. The rack bar and guide rod should be wiped with a greasy rag from time to time but no excess oil should be allowed as it will run down on the contact points at the bottom of the machine. These points should always be kept bright and clean. The brushes should bear firmly on the commutator but not so hard as to cut grooves in it, and the surface of the commutator must always be free from oil and dirt. Fine No. 00 sandpaper may be used for cleaning and polishing contact points and commutator when necessary but should be sparingly used and all particles of dust and grit wiped off afterwards. The outside of the box should be rubbed with a cloth and heavy oil at intervals to help preserve the wood, and all screws should be kept tight. The machine should be protected from sand and dust as much as possible as this causes undue wear on the moving parts such as rack bar and armature pinion. Proper care of a blasting machine will be fully reflected in the good service it will give.



Position of the hands preparatory to giving the handle the clockwise turn to generate the current



Position of the hands after completion of generation of current

There are a number of other sources of current which are more or less portable and convenient and which are sometimes used for the purpose of electric blasting. None of these is as reliable or safe as a blasting machine and none of them is recommended for regular use. The most important of them are described here because, in an emergency, knowledge of how to fire a blast by such means may prove of considerable practical value to a blaster.

The Ford automobile magneto, if in good condition, with the engine idling at a good speed has a generative capacity of approximately 9 volts and 30 amperes. The method of firing with this generator is to connect one leading wire from the blast to some spot on the frame of the automobile where clean, bare metal is exposed. Then while the engine is racing, the other leading wire is touched to the binding post on the back of the dash switchboard underneath the hood, where the red-colored wire coming from the magneto is attached.

The Fordson tractor has the same type of magneto and can be used similarly. On the tractor one leading wire is connected to the clean metal of the frame and, with the engine racing, the other leading wire is touched to the binding post on the left side of the engine housing frame, where the heavy wire leaves the magneto to go to the vibrator coil box.

With 500 ft. of duplex leading wire the Ford magneto when in good condition has the capacity to fire 5 electric blasting caps with 4-ft. wires if connected in series. If the caps are connected in parallel, the same magneto would have capacity to fire 8 electric blasting caps having 4-ft. wires.

The standard automobile storage battery when fully charged has a capacity of 6 volts and 90 amperes. In using this to fire blasts one leading wire is attached to the negative post while the other is touched to the positive post. The posts must be clean. With 500 ft. of duplex leading wire this battery can be expected to fire 3 electric blasting caps having 4-ft. wires if connected in series. If they are connected in parellel, the battery would probably fire 5 electric blasting caps.

With all three machines mentioned above it is advisable to use about 500 ft. of leading wire in order to keep the automobile at a reasonably safe distance from the blast and thus protect it against possible damage by flying debris.

The ordinary No. 6 dry cell when fresh produces about 1½ volts and from 25 to 30 amperes. In firing blasts with this the bare ends of the two leading wires are simply held against the two binding posts of the dry cell. With 200 ft. of duplex leading wire, this dry cell should fire one electric blasting cap with 4-ft. wires.

A Hot Shot Battery consists of from 4 to 6 dry cells connected in series. The number of electric blasting caps that can be fired depends upon the number of cells in the battery; 6 cells, of course, will fire more than 4 cells. A five-cell battery having a capacity of 6 volts and from 25 to 30 amperes, when fresh will fire about 4 electric blasting caps with 4-ft. wires, if connected in series, with 200 ft. of duplex leading wire. If the caps are connected in parellel, it should fire 7 caps.

While there are other batteries such as those used on some types of coal miners' lamps, flashlight batteries and similar types, that will fire an electric blasting cap under the proper conditions, they are generally of too variable a capacity to be of much practical use for this purpose.

The question of capacity at the time of use for firing a blast is of much importance with both automobile storage batteries and dry cells of all types. Age and deterioration have considerable effect on them; consequently the number of electric blasting caps they will fire depends upon whether they are up to full capacity. If not, they cannot be depended upon to fire the number of detonators given above. Another consideration regarding batteries of all types, dry cell or storage, is that they are always alive in an electrical sense and hence always constitute a potential source of danger. Vigilant care must be exercised to prevent the wires leading from a blast or the wires of a blasting cap from coming in contact with the posts of the battery until everything is in readiness for firing the blast. Accidental contact between the wires and these live posts has been the cause of many premature blasts and fatal accidents. If these forms of firing devices are to be used, they should be kept in a specially constructed portable box or other receptacle which will reduce the danger from the live posts.

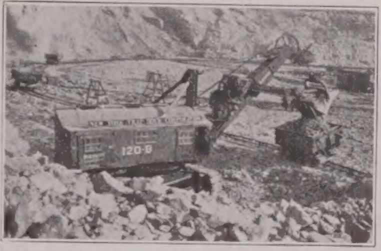
In conclusion, it is desired to emphasize the fact that even for shots of only one or two holes, blasting machines are the safe and reliable firing agent. Such other means of firing as automobile magnetos, storage batteries and dry cells should be used only under special circumstances and then only with the most precise care.

The 120-B Shovel in Mine and Quarry

Railroad-type shovels, long the most adequate digging tool in ore and rock, have always had certain inherent shortcomings, which resulted in the frequent installation of small revolving shovels on work which was unquestionably beyond their capacity. The railroad-type shovel lacked mobility. It worked very close to the bank and its digging and dumping radius was limited. On the other hand, the revolving shovel lacked the strength, power and capacity of the railroad-type.

The Bucyrus 120-B has been designed by the Bucyrus Co., South Milwaukee, Wis., to combine the advantages of both the railroad-type and the full revolving shovel. This new shovel, it is claimed, combines five qualities never heretofore found on one machine.

1. The speed of action of the railroad-type shovel.
2. The mobility of single truck caterpillars.
3. The full revolving swing.
4. Big dipper capacity, four yards.
5. Ruggedness and power greater even than the railroad-type shovel.



Four-yard full revolving shovel with single truck caterpillar put out by the Bucyrus Co.

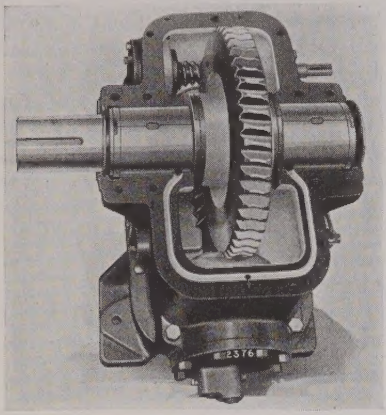
The machine has a dumping height of 20 ft. Its dumping radius is 36 ft. The boom is 29 ft. long and the rear end radius is 17 ft. The machine is designed and built with one idea constantly in mind, that of building a machine which would be as free from interruptions in operation as it was possible to build. To this end all parts are made with a ruggedness much greater than in shovels formerly built.

The machine is planned from beginning with the thought of efficient operation and the steam machine includes features which are entirely new in steam shovel design, such as fire brick arch and superheater as standard equipment. The electric machine is equipped with Ward-Leonard direct current, generator field control. It has been possible in the design of this machine to eliminate the necessity for compressed air on the machine.

Speed Reducing Gears for Ratios Exceeding 100 to 1

Worm reduction gears, as recently developed for the driving of slow and moderate speed machinery by means of standard high speed electric motors, give speed reductions from 4 to 1 to as much as 100 to 1 in one step, with satisfactory efficiency, but for higher ratios a one step worm gear would either require an inconveniently large wheel or else the teeth would be too small and weak.

For ratios above 100 to 1, as required for driving cooling tables, conveyors, stokers, heat treating furnaces, escalators, etc., it is therefore desirable to use two steps, with which the highest reduction ratios ordinarily required are readily attained. The two stage worm reduction gear illustrated herewith has been developed by the DeLaval Steam Turbine Co., Trenton, N. J., for ratios up to 8,000 to 1. The one casing carries all bearings for the high speed worm shaft, the low speed worm shaft, which also carries the high speed wheel and the low speed wheel shaft, thereby insuring accurate alignment and perfect meshing. There are only three working members, excluding the ball bearings of the two worm shafts, and these parts are heavy and rugged. End thrust and bending strains from the driving and driven machine are avoided by the use of flexible couplings of the pin and rubber bushing type.

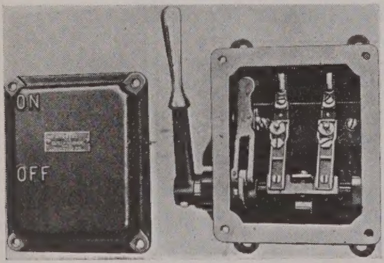


DeLaval double reduction worm gear with cover removed, showing both worm and gears, also lowspeed wheel bearings

The one piece casing also acts as an oil reservoir, the oil being carried at such height that it touches the high speed wheel and the low speed worm at all times. In addition, a positive oil pump draws oil from the reservoir and forces it through passages to the low speed shaft bearings. This is a valuable feature, as it is practically impossible, due to the low speed of this shaft, to lubricate the bearings satisfactorily by splash. Suitable filling and drainage openings and oil cocks are provided for controlling the oil level. Escape of oil along the high speed worm shaft is prevented by a packed gland, while the seepage of oil along the low speed shaft is avoided by the use of an oil slinger working between the end of the bearing and an oil guard surrounding the shaft and held in grooves in the casing and cover.

Watertight, Acid-Resisting, Remote Control Station

Quite frequently it is necessary to protect electrical apparatus against moisture, acid fumes, etc. To meet the requirements for this work the Cutler-Hammer Mfg. Co., Milwaukee, Wisconsin, has brought out the control station shown on the accompanying illustration.



Cutler-Hammer Two wire water tight master switch with cover removed

The mechanism is enclosed in a cast iron case, and has a cover fitted with a gasket, which excludes all moisture and fumes. A stuffing gland fitted to the shaft provides a tight fit, and the thick wall of the cast iron body allows enough threads for a tight conduit or pipe connection.

Contact is made on the brass cylinder by two heavy fingers of standard non-stubbing design. These fingers are mounted on asbestos lumber and are zinc plated as are all other small parts. The contact tips are of heavy bar rolled copper. The fingers are of sufficient capacity to permit the use of this master control station on any pilot circuit at all commercial voltages. The large polished brass handle gives a convenient grip to the average operator. It extends far enough from the case to indicate whether the station is open or closed. All parts are generously proportioned to reduce chances of breakage in rough or careless handling. The case is sprayed with a protecting paint to withstand submersion in water or the effect of acid fumes.

Schaffer Poidometers in the Cement Industry

The Schaffer poidometer, which is manufactured by the Schaffer Poidometer Co., Pittsburgh, Pa., is finding wide use for weighing, feeding and proportioning in the cement industry. It is recommended by the manufacturers as a precision machine designed to feed materials —by weight—in a steady uniform, constant stream.

The operation of the poidometer is described as very simple. All that is necessary is to set the scale beam at whatever amount of materials may be required per foot of belt travel, then adjust the gate to suit this weight and the poidometer will deliver this predetermined amount continuously and with accuracy.

It is stated by the manufacturers that poidometers are handling with equal success clinker components, clinker, finished cement and coal.

Among the cement companies where poidometers have recently been installed are: Standard Portland Cement Co., Painsville, Ohio, for feeding gypsum and clinker to the tube mills; Glens Falls Portland Cement Co., Glens Falls, N. Y., for weighing and feeding coal to the dryers; Santa Cruz Portland Cement Co., Davenport, Calif., for proportioning stone and shale, also gypsum and clinker; Coplay Cement Manufacturing Co., Coplay, Pa., for proportioning gypsum and clinker; Warrior Cement Corp., Spocari, Ala., for feeding gypsum and clinker to the tube mills; Nazareth Cement Co., Nazareth, Pa., for proportioning stone and clay; Monarch Cement Co., Humboldt, Kan., for feeding gypsum and clinker to the tube mills.

Trade Publications

Under the heading *The Achievements of the Westinghouse Electric and Manufacturing Company for the Year 1925,* the Westinghouse company, East Pittsburgh, Pa., has published a 44-page illustrated publication under the authorship of H. W. Cope. This book is 8½ x 11 in. with paper covers.

It is cited that even those engaged in the electrical industry cannot fully appreciate or understand the many and tremendous problems that are being solved; only these modest scientific men who are doing the work readily know. It is fitting therefore, to look backward as the year closes, and briefly enumerate some of their more outstanding achievements, commending them for their work well done, confident that in the coming year their efforts will be crowned with renewed success.

Among the various types of equipment of interest in the cement manufacturing field, specific mention is made of the clutch type synchronous motor.

The application of the clutch type synchronous motor, announced last year, has made rapid progress particularly in the cement and copper industries. This motor has been developed for use in applications where the well known advantages of the synchronous motor are desired and where high starting torque with low starting current is essential. The motor is a combination of a synchronous motor of standard type and a magnetic clutch arranged to form a compact self-contained unit. The motor rotor can be revolved independently of the load and after synchronous speed is reached the load can be started by exciting the clutch.

The first motor of this type was sold in October, 1924, and in the succeeding twelve months motors with a total rating of nearly 20,000 horsepower have been sold.